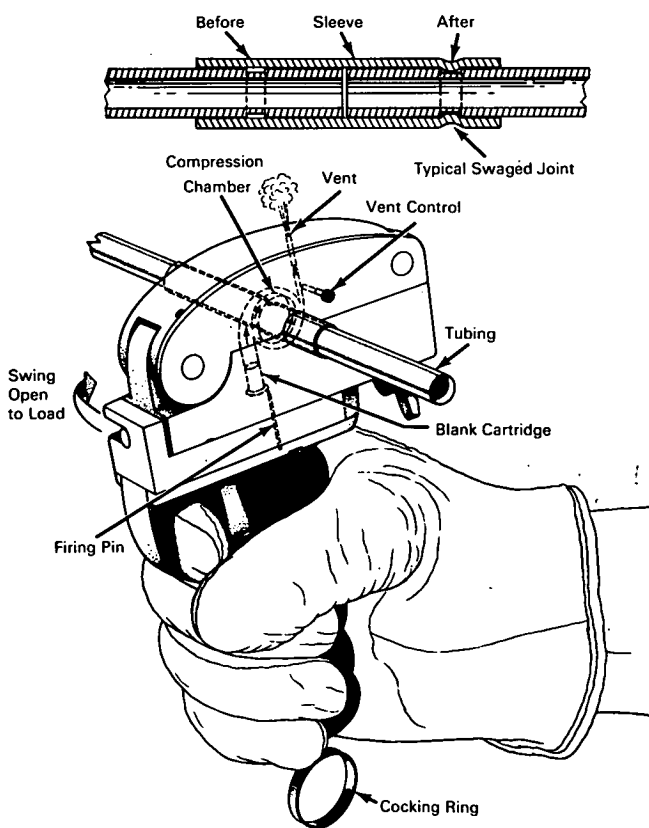


NASA TECH BRIEF



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Tube Swaging Device Uses Explosive Force



The problem:

In spacecraft there are many tubes, the complex arrangement of which necessitates many splices, couplings, and tees. The volume and weight of conventional fittings become quite a penalty in the restricted volume of the spacecraft. One method used involved a sleeve that was plated and sweat soldered. This method was temperature limited, and proved difficult to inspect by normal techniques.

The solution:

Tubing joined by explosive swaging. The tool shown joins a sleeve to a tube so that it provides a leakproof, lightweight, and strong assembly. An additional advantage of this method is that no new or different material is used in the joining and therefore the thermal and galvanic properties are maintained. This method is also an advantage when the tubing must carry reactive material such as hydrogen peroxide.

(continued overleaf)

How it's done:

The tool provides an annular ring cavity that fits tightly around the outer sleeve to be joined. A blank cartridge is fired into this cavity to increase the pressure on the surface of the tube (to about 12,000 psi in the case of aluminum) and inside the tool. The tubing sleeve deforms and swages into the tube being joined, creating a seal area. For applications necessitating a higher ultimate pressure capability for the coupling, a receiving groove is provided in the basic tube. A modified cutoff tool is used to roll in this groove.

The mating tube and sleeve are assembled, the tool is clamped over the desired seal area, and fired. The resulting groove, visible in the outer sleeve, gives a good indicator of the seal provided. In general, it is desirable to use a slightly softer temper in the outer sleeve.

Note:

Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Langley Research Center
Langley Station
Hampton, Virginia 23365
Reference: B68-10235

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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KSC HQS.